PREFACE

The still increasing demand for efficient synthetic chemistry of novel and biologically active organic compounds remains the major focus for the progress of efficient and new greener methodologies and their biological activity. The development of solvent-free processes in organic syntheses methodologies has picked up a speedy in sense of green chemistry. This entitled work is focussed on towards fulfilling our objective to syntheses newly bio-active novel hetero-molecules. Finally, we observed that thermal analysis study for a particular reaction is of quite immense help while designing another reaction conditions.

The present research work has design to syntheses of a variety of heterocyclic compounds and their application and some metal binding complexes under solvent-free condition. This thesis begins with **Chapter I,** which describe a brief review on heterocycles especially imidazole and quinazoline, Solvent-free reactions, about Green Chemistry and its principles, and Multi-component syntheses. **Chapter II,** in this chapter there are five sectional parts, In **section A**, deals with mainly synthesis of variety type imidazole compounds, *N*-substituted imidazole *N*-oxide, *N*-hydroxyimidazole *N*-oxide and finally imidazole *N*-oxide with mechanistically approach towards with and without catalyst in condensed phase reaction**. In section B,** mainly deals with preparation of the substituted 2-chloroimidazoles from imidazole *N*-oxides and their antimicrobial activity. **In section C,** general outline to syntheses of reported antibacterial activity of quinazoline derivatives from 3-amino-2-phenylquinazolin-4(3*H*)-one and their solubility increases using inclusion technique in β-cyclodextrin. **In section D,** preparation of acetoxyimidazoles through acetoxylation at C-2 position of imidazole *N*-oxide and their anticancer activity, showed by in vitro, bioinformatics and in vivo analysis. Finally **In section E,** further utility of substituted imidazole to produce imidazoles metal complexes using variety of metal salt.